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ABSTRACT

To clarify the perceptions of college freshmen regarding the kind of teaching they experienced in public schools and how those experiences relate to the split-brain theory, a study surveyed 241 first-semester college freshmen from the fall of 1984 to the fall of 1987 at Southwest Missouri State University. Only students who had completed at least six years of study in Missouri public schools participated in the study. To determine if students viewed their experiences as predominantly left or right brain oriented, or integrated, subjects identified the degree to which they had experienced various types of educational endeavors throughout their kindergarten through grade 12 experiences. Subjects also completed the Hough Brain Dominance Test to determine individual brain-dominance preferences. Responses showed that students perceived their public school experiences to be sometimes analytical, often sequential, concrete, rational, active, and quite goal-oriented, indicating that the students viewed their education in a traditional left-brain fashion. Similarly, students perceived the right-brain functions to be less dominant. (Two tables of data are included, and the student survey, brain dominance survey, results of brain dominance self-evaluation, five tables of data, and 28 references are appended. In addition, an addendum discusses brain dominance theory and the teaching of composition and includes three tables of data.) (MM)

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BRAIN DOMINANCE THEORY AND THE MISSOURI PUBLIC SCHOOL CURRICULUM AS PERCEIVED BY COLLEGE FRESHMEN AT SOUTHWEST MISSOURI STATE UNIVERSITY

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A Field Study

Presented to

The Faculty of the Graduate School

Southwest Missouri State University

in Partial Fulfillment

of the Requirements for the

Specialist Degree in Educational Administration

David Hough

December 1987

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Chapter 1

INTRODUCTION

Since neurosurgeon Roger Sperry won the Nobel Prize in medicine in 1981 for proving scientifically that the split-brain theory is a reality, new emphasis has begun to take place with regard to practical applications for how the human brain encodes, stores and disseminates information. In various disciplines (most notably art, business and education), the research for these new understandings lead to novel methods of instruction to accompany formative and cognitive development. Perhaps it is time for educators to at least become cognizant of the implications that the split-brain phenomenon might have on traditional public school curriculum.

Learning styles, brain functions, and curriculum development are not new topics among educators; however, a new point of view offered by brain dominance theory can enhance the sometimes narrow assumption that students can and will obtain, store and recall information as they adapt their styles of learning (compensate) to fit a given curriculum. Moreover, educators who do not have the luxury of "quality control" or "product guarantees" should be interested to ascertain the perceptions harbored by their graduates--especially after these students have been given time and distance enough to reflect on their K-12 education.

(1)

For years the proverbial pendulum of this educational clock has moved from "right" to "left" and back again, with little overall change in teaching methodology or curriculum. However, as scientists are begining to find out precisely what makes the clock "tick," educators will do well to listen closely, or suffer the tragic flaw of being too late to make up for their lost time.

Statement of the Problem

The public school curriculum historically has been geared to the "middle-of-the-road" learner and has not considered the medical/scientific aspect of the split-brain theory. The split-brain theory as it relates to formative and cognitive learning could have a definite impact on curriculum structuring if school administrators would attempt to incorporate this theory into their thinking.

Purpose(s) of the Study

The purpose(s) of this study are:

(1) to clarify the perceptions of college freshmen who are public school graduates, regarding the kind of teaching they experienced and how these experiences relate to the split-brain theory, e.g., left brain educators reward analytical, sequential, concrete, rational and active concerns over intuitive, spontaneous, emotional, artistic, playful and symbolic endeavors and

(2) to make recommendations that could be utilized by curriculum planners in order to realize the most from the learning process.

Assumptions and Limitations

(1) Lacking any practical scientific instrument(|o(ik-curately measure "correct" versus "incorrect" observations, student responses will have to be considered "accurate."

(2) College freshmen at SMSU who provide the sole source for the data gathered must be considered a representative sample.

(3) Any given experience a student has had may cause reactionary responses and therefore make the study less valid, as the philosophical dilemma of "actual versus perceived" occurrences will never be resolved.

(5) Part of the study will deal with scientific fact and part will deal with theory; the two cannot be assumed to be one.

Definition of Related Terms

(1) EEG -- electroencephalogram; a graphic of the electrical activity of the brain, measured by the electroencephalograph, the instrument that monitors this activity.

(2) Right Brain -- functions that occur in the right side of the brain; synonyms: right hemisphere, right side, right lobe.

(3) Left Brain -- functions that occur in the left side of the brain; synonyms: left hemisphere, left side, left lobe.

(4) Hemispherity -- the concept, theory or phenomenon of brain dominance.

(5)Integrated -- both hemispheres work together, or a person does not show a significant preference nor tendency to engage one hemisphere more than the other.

Chapter 2

REVIEW OF RELATED LITERATURE

Prior to 1974, mention of the split-brain phenomenon was confined primarily to facts gleaned from medical journals that addressed problems caused by damage to the brain. "The fact that there are human cerebral lateral asymmetries has been recognized for over 120 years. . . . It is only within the past 20 years, however, that fundamental questions regarding the development of lateralization have been addressed."[1]

Roger Sperry's studies dealing with epilepsy, based on research in the 1950s, and culminating in 1974, as early as 1961 caused researchers to probe more deeply into the function of the two sides of the brain. Sperry's research not only won him the Nobel Prize in medicine in 1981 but also spawned a plethora of ideas as to the relationship of theory and practice. Despite allegations that these neurological findings are often misinterpreted, the theory that has emerged from hemisphericity is that each side of the brain processes information in clearly distinctive fashions.[2]

In 1979 Betty Edwards published Drawing on the Right Side of the Brain, in which she says learning to draw can be

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[1]Frank Benson and Eran Zaidel, eds. The Dual Brain, (New York: The Guilford Press, 1985), p. 97.

[2]E.P. Torrence, "Hemisphericity and Creative Functioning," Journal of Research and Development, 15, No. 3 (1982), 271-278.

achieved by "developing a new way of seeing by tapping the special functions of the right hemisphere of your brain...."[3] Five years later Jacquelyn Wonder and Priscilla Donovan published Whole Brain Thinking, based on the premise that both hemispheres of the brain must work together depending on the nature of the task and the type of results desired. This approach mandates that individuals recognize a brain function and attempt to adapt to that function.[4]

Currently, the trend seems to support this latter concept that each hemisphere relies somewhat on the other to completely process information. In fact, in his May 1985 article "Right Brain, Left Brain: Fact and Fiction," in Psychology Today Jerre Levy calls "right brained and left brained" labeling "a misinterpretation of the facts, a pop psychology myth . . . [which] is often represented as scientific fact. It is not."[5]

In his 1975 article "Lateral Dominance and Aesthetic Preference," however, Levy reports findings that do support brain functions that are dominant:

> Left and right handers were found to differ in the preferences for mirror versions of vacation slides. Preferences of one group of right handers were predictive of preferences for another group of right handers, but not all left handers. In a second study, it was found that slides strongly preferred by dextrals were those with the more important con-

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[3]Betty Edwards, Drawing on the Right Side of the Brain, (Boston: Houghton Mifflin Co., 1979), vii.

[4]Jacquelyn Wonder and Priscilla Donovan, Whole Brain Thinking, (New York: William Morrow and Co., 1984).

[5]Jerre Levy, "Right Brain, Left Brain: Fact and Fiction," Psychology Today, (May 1985), 38.

> tent, or the greater heaviness on the right, and that slide assymetry was highly correlated with dextral, but no sinistral preferences. Results were interpreted as reflecting a left field perceptual bias induced by selective right hemisphere activation in right handers. 6

One of Roger Sperry's co-workers who assisted in the original hemispheric brain studies, Michael Gazzaniga, categorically denies the theory of dominance. He states, "I think this notion of linear, unified conscious experience is dead wrong. I argue in contrast that the human brain has a modular organization; it is organized, that is, into relatively independent functioning units that work in parallel ways."[7]

He goes on to say that "these modules frequently operate apart from our conscious verbal selves."[8] Until scientific fact proves brain functions and lateral dominance, however, the proper labelling must be "theory."

Gazzaniga says, "the simple fact is that you don't have to invoke one cent's worth of experimental psychological data or neuroscience to make the observation that there are some people in this world who are terribly intuitive and creative, and some who aren't."[9] In short, whether fact or

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[6]Jerre Levy, "Lateral Dominance and Aesthetic Preference," Neuropsychologia, (1976), 431.

[7]Michael S. Gazzaniga, "The Social Brain," Psychology Today, (November 1985), 30.

[8]Ibid, p. 30.

[9]Michael S. Gazzangia, "Behavior," Discover, (April 1985), 34.

myth, the brain dominance theory does provide significant reason for the study of learning styles.

In business, for example, such devices as the Herrman Participant Survey Form purport to measure thinking styles. "This instrument was further validated by Lawrence Schkade and Al Potvin in a series of studies using EEG-waveform analysis."[10] The Hermann Brain Dominance Scale is currently recognized as the archetype from which all other such measurements are derived.

Regardless of the type of measurement device to determine brain preference, the EEG does scientifically depict the electrical impulses as they are at work in the brain. Benjamin M. Glassner performed an EEG study on students at the Michigan Technological University in Houghton, Maine, and found that during the writing process students used the left hemisphere of the brain to cope with verbal tasks and the right hemisphere to deal with non-verbal ones.[11] His study also indicates that students must be able to combine both hemispheres in order to produce a fully developed piece of writing. He states, "that there are indeed two principal modes of composing . . . and that they are related to the separate but interacting spheres of the cerebral cortex."[12]

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[10]James C. Quick, Lawrence Schkade, and Mark E. Eakin, "Thinking Styles and Job Stress," Personnel, (May 1986), 44.

[11]Benjamin M. Glassner, Hemispheric Relationships in Composing: An EEG Study (ERIC ED 214 172).

[12]Ibid., pp. 10-11.

Whether it be drawing, managing, or writing, those who study the split-brain theory agree that at the very least novel suppositions are lying in wait--ready to be explored.

More specifically, in education the brain experts agree that methods of instruction and learning may benefit from lateral dominance theory. Richard L. Hopkins, Associate Professor of Education Policy, Planning, and Administration in the College of Education at the University of Maryland at College Park, Maryland, says, "the literacy we have focused so much on in our educational system is mainly the province of the left hemisphere of the brain and that the functions of the right hemisphere are little understood and perhaps neglected in our educational system."[13] If this is true, perhaps the suggestion of Edwards, Wonder and Donovan, Galaburda, Hatcher, and others may be of some benefit as educators attempt to find new ways to reach varied learning styles.

Various methods of attempting to apply brain dominance or lateralization theory have been explored. One technique called "centering" involves a conscious shift back and forth from one hemisphere to the other.[14] Andrew Young of the Department of Psychology at the University of Lancaster

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[13]Richard L. Hopkins, "Educating the Right Brain," Clearing House, (Nov 1984), 132.

[14]Margaret Hatcher, Centering Through Writing: Right Brain/ Left Brain Techniques Applied to Writing. (Lanham, Maryland: University Press of America Inc., 1983), 13.

says, "the mind is not easily dichotomized in a way that provides much in the way of detailed insight into psychological processes, and it is naive to think that the brain is any simpler. No one cognitive function is completely dependent on one hemisphere or the other."[15]

According to a 1983 study, several factors were identified with right brain learners; varying degrees of study habits, of lighting, formality, motivation, and learning styles could be associated with either right or left dominants.[16] J. G. Thornell believes that lefts have a distinct advantage over rights in the traditional schools where most learning is "analytical" rather than "global."[17] Others agree that "we have neglected teaching patterned thinking generally in education. . . . Many professional fields and everyday life experiences, however, presently require the patterning abilities of the right hemisphere."[18] These "two cognitive styles" may necessitate an imperative need to assess our current education system to determine if, in

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[15]Andrew W. Young, ed. Functions of the Right Cerebral Hemisphere. (New York: Academic Press, 1983), p. 212.

[16]Rita Dunn, et. al. "Learning Style: Researchers Define Differences Differently," Educational Leadership, 38, No. 5, (1981), 372-375.

[17]J.G. Thornell, "Research on Cognitive Styles: Implications for Teaching and Learning," Educational Leadership, 33, No. 7, (1976), 502-504.

[18]Hopkins, op.cit., 133.

fact, we are educating one half rather than the total brain.[19]

If hemispheric dominance can be identified,[20] and if learning styles are related to this preference,[21] and if individuals are capable of identifying their styles,[22] then educators must not overlook the implications.

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[19] Sally P. Springer and George Deitsch, Left Brain, Right Brain, New York: W.H. Freeman and Company, 1985), 235-247.

[20] Torrence, loc. cit.

[21] R. Zenhausern, "Hemispheric Dominance," Learning Styles Newsletter, 1, No. 2, (1980), 3.

[22] Rita Dunn, "Can Students Identify Their Own Learning Styles?" Educational Leadership, 40, No. 5, (1983), 60-62.

Chapter 3

DESIGN OF THE STUDY

First semester freshmen enrolled in David Hough's English 81, 111, and 150 classes at Southwest Missouri State University from the fall of 1984 to the fall of 1987 were asked to participate in this study. The students were asked to complete a survey (Appendix A) to identify their educational backgrounds. Only those "traditional" students who had graduated from a public high school in Missouri the spring preceding their enrollment at SMSU were considered in this study. In addition, only students who had completed at least six years of study in Missouri public schools were used.

Next, these college freshmen were asked to identify the degree to which they had experienced various types of educational endeavors throughout their K-12 experiences (Appendix B). The intent, here, was to determine if students viewed their experiences as predominantly left or right dominant, or integrated.

Finally, these students completed the Hough Brain Dominance Test to determine individual preferences (Appendix C). This instrument was devised by gleaning various segments from several different brain dominance tests and correlating them randomly. (It needs to be noted that this test had not been proven to be scientifically accurate.)

Chapter 4

Results of the Surveys

Two hundred eighty-seven students completed the Student Survey, Appendix A. Of this group two hundred forty-one did fit the category of first semester freshmen who had graduated from a Missouri high school in the spring immediately preceding their fall enrollment at SMSU. All of the two hundred forty-one students had completed at least six years of public schooling in Missouri. Any student who did not fit these descriptors was omitted from the study.

Following is a year-by-year breakdown of the number of students included in this study:

fall	1984	62	students included
"	1985	71	" "
"	1986	43	" "
"	1987	65	" "
	Total	241	

This sample group represented a random selection and then a selected group was chosen to fit the descriptors previously outlined, allowing for a controlled evaluation of the educational program. One hundred thirty-three were females between the ages of seventeen and nineteen; one hundred eight were males between the ages of seventeen and nineteen. One hundred twenty-nine students graduated from high schools in southwest Missouri, thirty-eight from the St. Louis area, fifty-two from the Kansas City area, and the

remaining twenty-two graduated from high schools located in other parts of Missouri. Thirty-one students had attended more than one Missouri high school, and two hundred thirty had attended all thirteen years from K to 12th grade in Missouri schools.

The "typical" student in this survey was an eighteen-year-old, first-semester freshman who attended public schools in Missouri for thirteen years and who graduated from high school in the spring immediately preceding enrollment in the fall of that same year at SMSU.

The survey located in Appendix B is the instrument used to determine how students perceived their educational experiences. Table 1 represents the number of responses to each characteristic and Table 2 reveals the mean scores for each. Tables 3 through 5 show mean scores for students who identified themselves as right-brain dominant, left-brain, or integrated. Continued in Appendix C is the questionnaire instrument used to help students determine their dominance, and the results in Appendix D reveals the specific number of students identified in each category.

Table 1 is used to report numerical results; Tables 2 through 5 and Appendix D are used in the analysis.

from
Appendix D

Left Brain		Right Brain		Integrated	
Male	Female	Male	Female	Male	Female
60	52	37	70	9	13
Totals: 112		107		22	

---

from
Table 2

1. Intuitive	2.58	7. Artistic	3.33
2. Analytical	3.16	8. Rational	3.24
3. Spontaneous	2.76	9. Playful	2.76
4. Sequential	3.94	10. Active	3.15
5. Emotional	2.79	11. Symbolic	2.45
6. Concrete	3.38	12. Goal oriented	3.57

Of the two hundred forty-one students surveyed, twenty-five indicated that their educational experiences were "almost never" intuitive. Eighty-eight reported this to be "seldom," one hundred five marked "sometimes," nineteen said "often," and only four indicated that their education was "almost always" intuitive.

Ninety-one students felt their education was "sometimes" analytical and eighty-one felt it was "often" analytical. While forty-four responded "seldom," twelve marked "almost never" and thirteen marked "almost always."

One hundred eleven students viewed their educational endeavors as "sometimes" spontaneous, but fifty-seven said

it was "seldom." Forty-two felt spontaneity was "often" a part of their educational experience, and only five indicated it was "almost always" spontaneous. Twenty-six, however, saw this as "almost never."

Only six students viewed their education as "almost never" sequential; nineteen marked "seldom," and twenty-eight marked "sometimes." One hundred nineteen indicated that their education was "often" sequential and sixty-nine reported it to be "almost always" sequential.

Only two students felt their education was "almost never" emotional, and just three felt it was "almost always" emotional. One hundred twenty-five marked "sometimes"; thirty marked "often"; eighty-one students indicated that their educational experiences were "seldom" emotional.

In terms of being concrete, eleven students responded "almost never," thirty marked "seldom," ninety-three marked "sometimes," seventy-six marked "often," and thirty-one answered "almost always."

Nineteen students felt their education was "almost never" artistic, but forty-three felt it was "almost always" artistic. Sixty-one responded "often"; eighty-eight indicated "sometimes"; thirty marked "seldom."

A rational education was labeled "sometimes" by seventy-five students, while sixty-one marked "often" and forty-three indicated "almost always." Fifty-two students viewed their education as "seldom" rational, while fourteen felt it was "almost never" rational.

While only eleven students saw their education as "almost always" playful, thirty-two perceived it to be "almost never" playful, and another fifty-six indicated that they felt it was "seldom" playful. Forty-one students viewed this as "often" a characteristic, and one hundred one reported it to be "sometimes" representative of the educational experience.

One hundred twenty-five students responded that their education had been "sometimes" active, and thirty-nine marked "often" with twenty-eight indicating "seldom." While eighteen labeled this "almost never" a characteristic, thirty-one indicated that it was "almost always" representative of their experiences in schools.

Only nine students felt their education to be "almost always" symbolic, while twenty-nine felt it was "almost never" so. Thirty-two considered it to be "often" as a symbolic experience, and forty-seven responded "sometimes." One hundred twenty-four students perceived their students to be "seldom" symbolic.

While forty-three students viewed their education as "almost always" goal-oriented, thirty-nine felt it was "seldom" this way, and only three students considered a goal-oriented education "almost never" present. Fifty-nine indicated "sometimes" their education was goal-oriented, but ninety-seven said it was "often" a characteristic of their public school experience.

Chapter 5

ANALYSIS OF THE DATA

The mean scores for all groups of students tended to cluster around 3.00, indicating a general reluctance to definitely commit to a given perception. However, if one groups all the even-numbered characteristics from Table 2 and all the odd-numbered characteristics, the left-brain/right-brain traits, respectively, can be analyzed.

The students in this sample perceived their public school experiences to be sometimes analytical, often seqential, concrete, rational, active, and quite goal-oriented. These responses seem to indicate that the students, as a total group, view their education in a traditional left-brain fashion. Similarly, the group perceives the right-brain functions to be less dominant. Although sometimes intuitive, spontaneous, and emotional, public schools in Missouri were percieved to be seldom symbolic. The group felt their education to be somewhat playful but stressing artistic endeavors even more.

Since these students feel their education has been more left-brain oriented than right-brained, one may wonder if given "types" of students may harbor varying attitudes. For this analysis, Tables 3, 4, and 5 depict individual mean scores for left-, right-, and integrated students and Appendix D shows the number of students identified in each group.

Of the one hundred twelve left-brain dominant students, the one hundred seven right-brain students, and the twenty-two integrated, no apparent discrepancy emerges. Regardless of dominance, the mean scores tend to cluster around the middle and support the overall perceptions of the group as a whole.

Although left-brain students view their education to be slightly more sequential and concrete than right-brain students perceive them, the integrated group supports the middle ground. Left-brain students' mean scores tend to be slightly higher for left-brain characteristics and slightly lower for right-brain ones, and right-brain students' mean scores tend to be slightly higher for right-brain characteristics and lower for left-brain ones. However, the differences are only minor and are not consistent. The twenty-two integrated students indicate no pattern of any difference from either left- or right-brained students and overall parallel the total group's scores.

Chapter 6

CONCLUSION AND RECOMMENDATIONS

The surveys were attempts to determine how college freshmen view their public school experiences in terms of current brain dominance theories. Because this study dealt with perceptions, an attempt was made to avoid presenting human opinion as scientific fact, especially with regard to individual brain dominance identifiers. As a result this study indicates that college freshmen tend to identify left brain characteristics as dominant traits in public schools. Although right brain characteristics are generally present, the students felt them to be stressed less frequently than the left counterparts. Public school education in Missouri, then, may be geared more to left-brain functions than to right-brain ones. This may not be of any surprise to most educators; however, the fact that left-brained students and right-brained students viewed their experiences in similar fashions may be significant. The notion that perceptions tend to be biased may not hold true, as students may be able to objectively identify the type of instruction they have encountered. Further, as the Addendum points out, these perceptions can be supported by other studies within specific disciplines, or areas of learning, i.e., subjects.

The author recommends that follow-up studies be conducted to provide a more comprehensive view of public education in Missouri, and that if the data here are supported, then educators need to reevaluate the content and methodology

within the total school curriculum to more equally balance the scope of learning --in short, to educate the whole brain. Educators, at the very least, should consider incorporating learning activities that will satisfy both styles of learning, and public school curriculums may need restructuring to accommodate a more balanced learner. Future implications may suggest that brain dominance theory is just practical fact, that some learners learn best from emotional experiences and others learn best from physical, or "hands on" experiences. Whatever the future holds for brain dominance and education, though, it is clear that students perceive public education to be more left-brained than right-brained, and educators are faced with the challenge to address the complexities of this type of "head-hunting."

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Appendix A

Student Survey

Age _____ Male _____ or Female _____

Freshman _____ 1st semester _____ or 2nd semester_____

Sophomore _____

Junior _____

Senior _____

Other _____ Explain _____

Semester: Spring _____ Summer _____ Fall _____ Year _____

In what year did you graduate from high school? _____

Name of above high school _____

City _____ State _____

Private _____ Public _____ Other _____

Number of years you attended above high school _____

If you attended another high school, give the name, city, state:

_____

Total number of years you attended public schools in Missouri: _____

If you have graduated from a public high school in Missouri in the spring preceding your enrollment at SMSU, check here _____

If the above description does not fit you, check here _____

Appendix B

On a scale of 1 to 5, circle the number that you believe best describes your overall public school experience in Missouri.

		Almost never	Seldom	Sometimes	Often	Almost always
1.	intuitive	1	2	3	4	5
2.	analytical	1	2	3	4	5
3.	spontaneous	1	2	3	4	5
4.	sequential	1	2	3	4	5
5.	emotional	1	2	3	4	5
6.	concrete	1	2	3	4	5
7.	artistic	1	2	3	4	5
8.	rational	1	2	3	4	5
9.	playful	1	2	3	4	5
10.	active	1	2	3	4	5
11.	symbolic	1	2	3	4	5
12.	goal-oriented	1	2	3	4	5

Appendix C

Brain Dominance
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When I used to speak of hemispheric dominance, my colleagues immediately attempted to turn the conversation into an East/West global struggle discourse--pitting the United States and Western Europe against Russia and the Eastern Block countries. Not any more. They have become (whether they like it or not) increasingly aware of the workings of our two brains--the left hemisphere and the right hemisphere--because this is practically all I talk about any more. I've even found ways to incorporate this relatively new research into my teaching stratagem.

We all have two brains which work in slightly different ways, but not too many of us consciously consider which lobe, the right or the left, we engage more frequently. To determine which brain you tend to feel more comfortable with, take this preliminary test which will reveal to you your hemispheric dominance.

Circle the correct response:

	Never	Sometimes	Often	Usually	Alway
1. I am practical.	1	2	3	4	5
2. I watch TV.	1	2	3	4	5
3. Common sense is right.	1	2	3	4	5
4. I make decisions based on feelings.	1	2	3	4	5
5. I understand people.	1	2	3	4	5
6. I am an analytic reader.	1	2	3	4	5
7. I remember faces.	1	2	3	4	5
8. I am good at interpreting body language.	1	2	3	4	5
9. Whenever I am engaged in experimentation, I do so under controlled conditions.	1	2	3	4	5
10. I am warm hearted.	1	2	3	4	5
11. I am inventive.	1	2	3	4	5
12. I read and enjoy doing so.	1	2	3	4	5
13. Common sense is questionable.	1	2	3	4	5
14. I make decisions based on facts, i.e., standards and rules.	1	2	3	4	5
15. I understand ideas.	1	2	3	4	5

16. I am a synthesizing reader, i.e., I read for total concepts, putting ideas together as a whole.	1	2	3	4	5
17. I remember names.	1	2	3	4	5
18. I retain well what I hear and/or read.	1	2	3	4	5
19. I like to experiment randomly and without many restraints.	1	2	3	4	5
20. I am cool headed.	1	2	3	4	5
21. I like multiple choice tests.	1	2	3	4	5
22. I like essay tests.	1	2	3	4	5
23. I like talking and writing.	1	2	3	4	5
24. I like drawing and manipulating objects.	1	2	3	4	5
25. I solve problems in a logical order.	1	2	3	4	5
26. I use my intuition to solve problems.	1	2	3	4	5
27. I like to finish what I start.	1	2	3	4	5
28. I like to begin several new projects and have many "things" going on at the same time.	1	2	3	4	5
29. I am well organized, planned/structured.	1	2	3	4	5
30. I am fluid and spontaneous, and I do not work well within the framework of a formal structure.	1	2	3	4	5
31. I am right-handed.	1	2	3	4	5
32. I am left-handed.	1	2	3	4	5
33. I would do well as a contestant on "Name That Tune."	1	2	3	4	5
34. I dream, remember many dreams, and feel several dreams are important.	1	2	3	4	5
35. I do well in mathematics.	1	2	3	4	5
36. I have a command of the language.	1	2	3	4	5
37. I prefer solving problems by breaking them down into parts, then approaching the problem sequentially, using logic.	1	2	3	4	5

38. I respond will to kinetic stimuli (movement, action).	1	2	3	4	5
39. I frequently use metaphors and analogies.	1	2	3	4	5
40. I enjoy research.	1	2	3	4	5
41. I enjoy art.	1	2	3	4	5
42. I enjoy poetry.	1	2	3	4	5
43. I am good at thinking of funny things to say and I say them--even though not everyone thinks as I do.	1	2	3	4	5
44. I prefer to learn details and specific facts.	1	2	3	4	5
45. I prefer to analyze problems by listening to experts.	1	2	3	4	5
46. When I remember things or think about things, I do so best with words--not images.	1	2	3	4	5
47. I am skilled in sequencing ideas.	1	2	3	4	5
48. I would rather own a dog than a cat.	1	2	3	4	5
49. My mood changes.	1	2	3	4	5
50. I prefer total quiet when studying or concentrating.	1	2	3	4	5

Note: These fifty brain dominance discriminators are gleaned from the following sources:

Edwards, Betty. Drawing on the Right Side of the Brain. Boston: Houghton Mifflin Co., 1979.

Wonder, Jacquelyn, and Priscilla Donovan. Whole Brain Thinking. New York: William Morrow and Compnany Inc., 1984.

Zenhausern, R. Hemispheric Dominance." Learning Styles Newsletter, 1, No. 2 (1980), 3.

Tally Sheet

Add the scores for each question to reach a sum or total numerical figure for each hemisphere:

Left	Right
1. _____	2. _____
3. _____	4. _____
6. _____	5. _____
9. _____	7. _____
12. _____	8. _____
14. _____	10. _____
15. _____	11. _____
18. _____	13. _____
20. _____	16. _____
21. _____	17. _____
23. _____	19. _____
25. _____	22. _____
27. _____	24. _____
29. _____	26. _____
31. _____	28. _____
35. _____	30. _____
36. _____	32. _____
37. _____	33. _____
40. _____	34. _____
44. _____	38. _____
45. _____	39. _____
46. _____	41. _____
47. _____	42. _____
48. _____	43. _____
50. _____	49. _____
Total _____	Total _____

The greater number reveals your preference, or hemispheric dominance.

Subtract the smaller total (either left or right) from the larger total (either left or right) to find the degree to which you tend to favor one brain over the other.

Consult the following page.

Results

The lowest possible total for either hemisphere is 25, which (obviously) indicates a tendency to avoid engaging that brain. The highest possible total for either hemisphere is 250 which (again, obviously) indicates a tremendous tendency to engage that brain.

The degree to which you tend to engage one hemisphere more than the other illustrates your dominance in one brain or your perceived preference to work in a given hemisphere. The greatest degree of difference is 225 (which indicates a strong preference one way or the other), while the smallest degree of difference is 0, (which indicates no preference, or an integrated mind).

Most people are either left or right brain dominant; few are integrated. But the degree of preference is (as William "Bill" the Bard would say) "the thing." Most people prefer to engage one brain in a given circumstance, another in yet a different situation, thereby developing a smaller degree of difference between the two lobes.

Neither left-lobe dominance/right-lobe dominance nor integration is necessarity "preferred"; however, studies seem to support the notion that such factors as sex (that's male or female), genetics, cultural factors, and occupation/professions seem to influence how you "operate" and how you came to develop your hemispheric dominance--the brain you feel more comfortable engaging.

Scale

Difference in favor of:		
Left	Right	
0-5	0-5	no measurable difference; this means that you either lied on your responses, you're "schizo," or integrated--the latter being the norm; you've learned how to switch back and forth between lobes to suit various situations; life is probably fun for you, but you may not have a set method for doing things. (This sounds a little too horoscopicish.)
6-15		a firm left lean; you may be much like the right counterpart who has a similar score, only in the other hemisphere; you probably tell jokes in an organized fashion; you are probably a well organized person but may not recognize this fact; you may be surprised you're in this category--your friends probably suspected that you would be, though

Left	Right	
16-50		definitely a left lobe person; many of the characteristics demonstrated by various brain dominance experiments apply to you--a few may not; you probably knew you would fall into this category, and you probably feel comfortable here; anything out of the ordinary upsets your apple cart; you like organization; you like structure, order; you may enjoy mathematics and/or language; often play crossword puzzles or other such games
51-125 (Few people will have a difference greater than this; if you do, draw your own conclusions.)		Hard core left-lober; probably an administrator or a businessman--or you'd like to be; a knack for an enjoyment of order and organization; punctual; a "do-it-to-them-before-they-do-it-to-you" attitude; well off, at least middle class or perceive yourself as better off than you actually are; cannot tolerate errors--especially your own; you think right lobe people are weirdoes and that the government needs to spend more money on defense and blast the commies off the face of the earth
	6-15	a moderate right; again, much like the left 26-75er only your jokes are probably less formal and not as accurately presented--you may be the only one who sees the humor; you may see yourself as organized, but others think you unorganized; this fact may surprise you but not your associates; you like to daydream
	6-50	you lean in the "right" direction (pun); probably witty, clever and fun to be around because you listen well and work well with others; you may be the only one who knows how you "operate" and that's fine with you; although you understand others' ideas you stick to your own and believe in your philosophies; you respect others and they respect you
	51-125 (Ditto for this numerical difference from above.)	basket case right; probably a poet, perpetually late; forgetful, a humanist with a cause; not rich, or if you are you don't flaunt it; a distaste for bureaucracy; a dislike of order; you're organized in <u>your</u> way alone; you view problems from others' perspectives; you like to experiment frequently with new things; you may become a manic depressant because you cannot solve all the world's problems

Appendix D

Results of Brain Dominance Self-Evaluation

Following are the figures produced from the Hough Brain Dominance Exam. It should be noted that this instrument is not construed to be statistically valid as the scale on the "Results" page of that test should indicate. The discriminators were chosen from three widely-used brain dominance tests--the Zenhausen being the only one with scientific validity.

Left Brain		Right Brain		Integrated	
Male	Female	Male	Female	Male	Female
60	52	37	70	9	13

Totals: 112 107 22

Table 1

How college freshmen view their public school education--K to 12

	Almost Never	Sometimes	Usually	Often	Almost Always
1. Intuitive	25	88	105	19	4
2. Analytical	12	44	91	81	13
3. Spontaneous	26	57	111	42	5
4. Sequential	6	19	28	119	69
5. Emotional	2	81	125	30	3
6. Concrete	11	30	93	76	31
7. Artistic	19	30	88	61	43
8. Rational	14	52	75	61	39
9. Playful	32	56	101	41	11
10. Active	18	28	125	39	31
11. Symbolic	29	124	47	32	9
12. Goal-oriented	3	39	59	97	43

N=241

Even numbered characteristics are indicative of left-brain funcitons: analytical, sequential, concrete, rational, active, goal-oriented.

Odd dumbered characteristics are indicative of right-brain functions: intuitive, spontaneous, emotional, artistic, playful, symbolic.

Table 2

SMSU Freshmen Mean Scores

1. Intuitive	2.58
2. Analytical	3.16
3. Spontaneous	2.76
4. Sequential	3.94
5.Emotional	2.79
6. Concrete	3.38
7. Artistic	3.33
8.Rational	3.24
9. Playful	2.76
10. Active	3.15
11. Symbolic	2.45
12. Goal-oriented	3.57

Table 3

Left Brain Students' Mean Scores

1. Intuitive	2.25
2. Analytical	3.25
3. Spontaneous	2.75
4. Sequential	4.10
5.Emotional	2.54
6. Concrete	3.95
7. Artistic	3.19
8.Rational	3.20
9. Playful	2.69
10. Active	3.20
11. Symbolic	2.41
12. Goal-oriented	3.75

Table 4

Right Brain Students' Mean Scores

1. Intuitive	2.73
2. Analytical	3.10
3. Spontaneous	2.79
4. Sequential	3.88
5.Emotional	2.95
6. Concrete	3.20
7. Artistic	3.41
8.Rational	3.29
9. Playful	2.82
10. Active	3.14
11. Symbolic	2.53
12. Goal-oriented	3.50

Table 5

Integrated Students' Mean Scores

1.	Intuitive	2.62
2.	Analytical	3.25
3.	Spontaneous	2.80
4.	Sequential	4.09
5.	Emotional	2.80
6.	Concrete	3.51
7.	Artistic	3.30
8.	Rational	3.31
9.	Playful	2.75
10.	Active	3.20
11.	Symbolic	2.42
12.	Goal-oriented	3.61

ADDENDUM

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Brain Dominance Theory and the Teaching of Composition

by

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Do you remember names or faces better? Do you like to follow a routine, or do you prefer spontaneity? Do you solve problems in a systematic, orderly fashion, or do you allow solutions to emerge or merely "appear"? The manner in which you answer these and other such questions may reveal which hemisphere of the brain you tend to engage more frequently, the type of personality you project, and the type of life-style you lead.

Since neurosurgeon Roger Sperry won the Nobel Prize in 1981 for proving scientifically that the split-brain theory is a reality, a few brave souls, (primarily in the fields of art, business, and education) have been applying this hemispheric dominance phenomenon to areas of specific interest. Of concern here is the impact of split-brain theory on the writing process and the instructional methods accompanying the teaching of composition.

Sperry's studies, which began in 1961, prove that the left brain and the right brain (connected by a fibrous network known as the corpus collosum which allows us to switch

instantly from one hemisphere to the other) control distinctly different aspects of human skills and behaviors. Moreover, each hemisphere possesses characteristics that are quite diverse. The left brain tends to be analytical, linear, explicit, concrete. The right is spontaneous, emotional, artistic, and symbolic. The left brain functions well in an organized, systematic fashion, whereas the right likes to learn by discovery. The left brain controls speech and language; the right dabbles in art. Each of us has a preference (due to culture, genetics, and a few perhaps unexplainable reasons) or a tendency to engage one brain more often than the other. We are either left lobe or right lobe dominant; a few are integrated--showing no measurable dominance either way. I wanted to put a few brain theories to task, to determine the significance this relatively new neurological research might have on my pedagogical practices.

As an English instructor at Southwest Missouri State University in Springfield, Missouri, I wondered where this new-found "head-hunting" might lead if I were to incorporate it into a few activities related to the teaching of composition. Teaching writing to college freshmen is not unlike teaching golf to someone who has been playing the game for several years but who has never been taught the proper methods and techniques. The beginner has to learn to break bad habits for which he has been compensating. The beginning writer has had some twelve-odd years of practice--usually developing some undesirable habits.

Freshmen who schedule for their first college writing course often enter the classroom with similar notions and expectations as to what professors want. Why? Some students respond well to certain exercises and assignments yet experience difficulty with others. Why? These would-be writers (albeit diverse in their personal learning styles and backgrounds) often articulate a notion that the writing instruction will be rather "traditional." Why?

In an attempt to answer, in part, these and other questions, I set up an evaluative process which I began at the start of the 1984 Fall Semester and carried through to the completion of the course. I attempted to find out how students viewed their K-12 education (in terms of left/right brain modes), how they viewed their writing instruction to date (in left/right modes), and finally how they perceived various writing assignments (in left/right modes). To do this I needed to determine which students were, themselves, left or right lobe dominant.

For the purpose of this project I used my two freshman composition classes--each consisting of twenty-seven students for a total number of fifty-four (54). Six other students began the course but did not complete it; they are not included in this study. The total group consisted of twenty-two males and thirty-two females, all of whom had graduated from high schools in the spring of 1984 and who were either seventeen or eighteen years of age at the beginning of the class. Three of the fifty-four students were

graduates of private high schools, and two others were graduates of less traditional public schools. Therefore, this study analyzes students' perceptions from a group composed of traditional public systems (89%), private schools (5%), and non-traditional public school systems (4%).

During the first week of classes, I asked the students to complete a questionnaire (Table 1) to determine how they perceived the formal education they had received from kindergarten through high school. Then they completed a similar questionnaire on the subject of writing to determine the type of writing instruction they had received (Table 2). Throughout the semester I gave the students a battery of left brain/right brain tests to reveal which hemisphere each student tended to engage more frequently (Figure 1). Finally, after having written eight expository essays and one research paper covering nine rhetorical modes, each student completed another questionnaire stating the level of difficulty each experienced while grappling with the individual writing assignment (Table 3).

To most educators my results do not seem earth-shattering, I'm sure; however, the two hemispheres of the brain that yielded these findings raise myriad questions concerning the structure of our educational system, the learner's adaptation to that system, and the writing instructor's approach to the entire curriculum and instruction.

Although Figure 1 is not based wholly on scientific data, each student received a thorough battery of hemispher-

ic dominance tests (adapted from Jacquelyn Wonder and Priscilla Donovan's Whole-Brain Thinking and various other learning style identifiers) and was allowed to ask questions at any time during the process. This was an important factor as students needed to know precisely what each characteristic involved, in an effort to minimize guesswork and maximize realistic identification. Most students had little difficulty identifying with either the left brain or the right brain characteristics. In fact, most determined their dominant brain with the first set of questions, and subsequent tests tended to reaffirm their positions. (Three students were identified as integrated. Two of these remained consistently integrated throughout the entire testing process; the third student never really found a consistent pattern and was only labelled with the integrated group so as to be eliminated from the left or right lobe statistical data.) The fifty-one (51) students used to compile the data contained in this study were consistently distinguished as left or right brain dominant.

Using the twenty-six (26) left brain dominant students and the twenty-five (25) right brain dominant students as a differentiation, Tables 1, 2, & 3 demonstrate some candid perceptions concerning the education system, curriculum, and methodology. Even numbered items in Table 1 indicate left brain characteristics; odd numbered items indicate right brain functions. One will note that neither the left lobe group nor the right lobe group differs significantly in the

perceptions of their educational experiences. Most students tend to support the notion that their K-12 educational programs were structured around a predominantly left brain world. These students view their previous educational system as somewhat analytical and active, but strongly sequential, concrete, rational, and goal-oriented--all left brain characteristics. Both groups also view their educational experiences as having been moderately playful and artistic, but seldom spontaneous or symbolic--right brain functions.

Applied to a specific subject, i.e., writing, again both groups responded in a similar fashion. Even numbered items in Table 2 are still left brain characteristics; odd, right brain. Apparently both groups believed their previous writing instruction to be left lobe dominant with the greatest emphasis placed on the product, mechanics, a specified assignment written neatly in prose. They perceived that less attention had been given to the right lobe factors involving the process, style and tone, emotions, and experimental verse; one exception, free choice of topics--a right brain function--was identified as frequently employed in students' past educational experiences.

Table 3, however, reveals marked differences between left brain and right brain functions. Here, left brain students reacted favorably to writing assignments developed by process, description, documentation/research, as they found these modes relatively easy but more difficult than the previous methods of development; however, they experienced

their most difficulties with example and narrative--supposedly less difficult forms of development.

Right brain students stated the opposite; they found example and narrative to be the "easiest" rhetorical modes. Definition was not too difficult, but they experienced more problems with process, cause and effect, and argument/persuasion. Description and documentation/research gave them a great deal of trouble. Both groups found division/classification to be only moderately troublesome.

Are certain writing assignments/rhetorical modes left hemisphere functions while others are right? Why did these students' responses differ in Table 3 while they remained in agreement in Tables 1 & 2?

First, I think the students did not differ significantly in Tables 1 & 2 because "one does not have to be a 'left lober' to recognize one," and they simply (as a group) pegged their educational experiences, and specifically their writing instruction, from kindergarten through high school as predominantly left brain oriented--although they had no knowledge at the time that they were designating it as such. Second, I think the first two tables only reaffirm what most educators already surmise, i.e., that our current public school system tends to be highly structured and concrete with much emphasis placed on "rational" thinking skills and the achievement of goals. (I have a hunch that "rational" thinking is probably confused with memorization, but that's another issue.) This tends to hold true in the writing

classroom as well. I wonder about other disciplines; are math and history classes, science laboratories, et al. "brainwashing" students to the left mode of thinking? (By the way, the term left has no political connotation, here. In fact, left lobers tend to be more conservative; right lobers lean in the liberal direction--a nice paradox.) If our educational system is structured around a left lober's world, what implications does this have on pedagogical practices? Are the right brains being "left" out?

Table 3 is a different story. It seemed to have released the Hyde in my Jeckyll-headed students. Why? Here's where I may find scalding the proverbial mountain a bit too taxing, for many reasons might lie at the core of the responses. Obviously, the nature of each assignment might have lent itself to one brain or the other, and I'm sure this was a significant element. Students' grades may have been an overriding criterion, as they perceived their difficulties with various assignments. Students' definitions of difficulty may contain a smorgasboard of factors. Other factors may indicate unreliable results, but the data seem to be consistent with current brain theory hypotheses.

The left brain handles order and organization well, is analytical and sequential; the right is holistic, searching for relationships simultaneously. Not only did my writing assignments require students to engage either the left hemisphere or the right, but the nature of a given method of development, or rhetorical mode, lends itself to a left or

right lobe process or function. Hense, modes such as process, argument/persuasion and documentation/research require logical, intellectual, sequential organization--left brain activities. Example (especially personal anecdotes) and narrative modes allow for a degree of experimentation, discovery, and emotion--right brain activities. Division/classification appear to remain neutral. This can be attributed to the writer's choice to either see parts and put them together (classification), a left brain function, or to see a whole and categorize its parts (division), a right brain function. In theory the students should have been neutral on this one, and they were.

Description need not be as difficult as I evidently made it, for the right brain students were inhibited by the nature of my assignment. I required the students to be as objective as possible; in fact, I asked that they strive for total objectivity, (perhaps an unrealistic request). While the left brain students could handle this, the right brains experienced a great deal of difficulty, as they found the omission of personal feelings and abstract words a hindrance to their style. As an instructional tool the students' responses to this assignment (and perhaps the research paper, too) indicate that my requests may have been somewhat unfair--at least in teaching methodology--to approximately one half of the group.

This brings me to the "clincher." Do teachers need to make two assignments each time an objective is to be met--

one for the left, one for the right? I don't believe so. Perhaps we only need to be more cognizant of our ability to shift from the left to the right hemisphere and vice versa. Teachers might learn how to instruct students to engage particular hemispheres as specific needs manifest themselves. For instance, my right brain students encountered extreme difficulty organizing and sequencing their research projects, as Table 3 indicates a mean of 4.25 or great difficulty working in this mode--although a follow up analysis did not show that their grades reflected substantially lower marks. However, had I provided more right brain experimentation accompanied by left brain structure, and had I shown them how to shift, perhaps the right brain students would have been more successful--at least more comfortable.

Although many more speculations might be articulated, I believe that my informal data lend support to the hemispheric dominance studies now in vogue. Further, I believe that educators may find themselves "peppered" with a barrage of brain dominance theories in the near future. Should not the public schools (private schools and institutions of higher learning, too) at least consider right brain goals if, in fact, these are being neglected? Should not our instruction be geared toward both brains instead of just the left, if this is the case. Should not educators familiarize themselves with both left brain and right brain pedagogical techniques and learn how to educate both brains by shifting

writing skills to accommodate both hemispheres? In short, are we ready to teach the whole brain?

Table 1

Students were asked to rate on a scale of 1 to 5--one being seldom, five being frequently--the following characteristics as each applies to the student's perception of his/her K-12 schooling experience.

Characteristic	Left Brain Students' Mean	Right Brain Students' Mean
(1) Intuitive	2.14	2.43
(2) Analytical	3.97	4.19
(3) Spontaneous	1.86	1.59
(4) Sequential	4.79	4.86
(5) Emotional	2.14	2.34
(6) Concrete	4.79	4.45
(7) Artistic	3.86	3.59
(8) Rational	4.43	4.86
(9) Playful	2.86	3.19
(10) Active	3.09	3.19
(11) Symbolic	1.86	2.05
(12) Goal-oriented	4.79	4.45

Note: Odd numbered items are associated with right brain activities; hense, a school structured around right brain goals would be intuitive, spontaneous, emotional, artistic, playful, and symbolic. Even numbered items are left brain functions; hense, a left brain school would be based on analytical, sequential, concrete, rational, active, goal-oriented activities. Both left and right lobe students perceived their schools as left brain structures, moderately playful, but strongly sequential, concrete, rational, and goal-oriented.

Table 2

Students were asked to rate on a scale of 1 to 5--one being little emphasis, five being great emphasis--the following as each applies to the student's perception of his/her K-12 schooling experience.

Characteristic	Left Brain Students' Mean	Right Brain Students' Mean
(1) Process	2.19	2.05
(2) Product	4.79	4.45
(3) Style and Tone	2.49	2.34
(4) Structure	4.15	4.19
(5) Emotional Impact	1.86	2.25
(6) Mechanics	4.89	4.45
(7) Free Choice of Topics	3.86	4.19
(8) Specific Assignments	4.45	4.19
(9) Poetry	1.86	2.09
(10) Prose	4.85	4.45
(11) Experimentation	2.14	2.34
(12) Neatness	3.86	3.59

Note: Odd numbered items reflect right brain activities or emphases while even numbered items reflect left brain activities or emphases. These students, regardless of personal brain dominance, view the K-12 writing instruction they have had as predominantly a left brain function--emphasizing the final product, structure, mechanics, specified assignments, written neatly in prose.

Table 3

Students were asked to rate on a scale of 1 to 5--one being little difficulty, five being great difficulty--the following methods of development. Each student had written a paper in each rhetorical mode, and this rating scale was completed as part of their final examination.

Rhetorical Mode	Left Brain Students' Mean	Right Brain Students' Mean
(1) Example	3.45	2.19
(2) Description	2.34	4.25
(3) Definition	2.69	3.19
(4) Cause and Effect	2.89	3.95
(5) Process	1.75	3.79
(6) Division/Classification	2.45	2.50
(7) Argument/Persuasion	2.89	3.96
(8) Narrative	3.45	2.05
(9) Documentation/Research	2.45	4.25

Note: I believe two factors contribute most to the variences among means: (1) the nature of the given assignment, and (2) the nature of a given method of development as dictated by the rhetorical mode. Left brain students tend to experience most difficulty with example and narrative; right brain students have more trouble with description and documentation/research. Are certain modes left brain functions and, therefore, require right brain students to switch, engaging the left for optimum performance? Is the same true for left brain students in a right brain mode? The answers to these questions are probably all the same--yes.